CLAIMS

We claim:

1. A method for increasing the reaction velocity of chemical binding of DNA to DNA probe molecules in a microarray or gene chip system for identification and quantitation of gene expression or single nuclotide mutations, where the solution that contains the DNA molecules is insonified with ultrasound.

2. A method according to claim 1, where the ultrasound waves produce streaming in the DNA solution.

3. A method for increasing the processing speed of DNA binding to DNA-probe molecules on a micro array, where ultrasound waves are used in the washing process of the micro array after the hybridization process.

4. A method according to claim 1, where the ultrasound is generated by bulk wave transducers in acoustic contact with the DNA solution.

5. A method according to claim 1, where the ultrasound bulk waves in the DNA are generated from ultrasound surface waves in a material in contact with the DNA solution.

6. A method according to claim 5, where the ultrasound surface waves are generated by electromechanical coupling between a piezoceramic film on the surface of said material in contact with the DNA solution, and metallic finger electrodes on the surface of said piezoeramic film.

7. A method according to claim 1, where the ultrasound bulk waves in the DNA solution are generated with cmut ultrasound transducers.

8. A method according claim 5, where said material in contact with the DNA solution is the micro array substrate itself.

9. A method according to claim 4, where the micro array substrate is mounted directly onto said bulk wave transducers.

10. A method according to claim 9, where said bulk wave transducers are made as piezoceramic films adhered to the micro array substrate.

11. A method according to claim 1, where the ultrasound is transmitted from the transducers that are external to the reaction chamber, the transducers being either in direct contact with the reaction chamber or in acoustic contact with the reaction chamber through a contact material, such as a fluid or a solid.

12. A method according to claim 11, where several micro-array reaction chambers are processed in parallel, where all the reaction chambers are in contact with the same material where the ultrasound waves are generated, wherefrom the ultrasound waves are coupled into all reaction chambers in parallel.

13. A method according to claim 3, where the ultrasound is generated by bulk wave transducers in acoustic contact with the DNA solution.

14. A method according to claim 3, where the ultrasound bulk waves in the DNA are generated from ultrasound surface waves in a material in contact with the DNA solution.

15. A method according to claim 3, where the ultrasound bulk waves in the DNA solution are generated with cmut ultrasound transducers.

16. A method according to claim 3, where the ultrasound is transmitted from the transducers that are external to the reaction chamber, the transducers being either in direct contact with the reaction chamber or in acoustic contact with the reaction chamber through a contact material, such as a fluid or a solid.